AN INTEGRATED FIELD DATA COLLECTION SYSTEM FOR DENDROCHRONOLOGY

Peter Brewer and Chris Guiterman

Laboratory of Tree-Ring Research

THE UNIVERSITY OF ARIZONA

Favorable years

Difficult years

SUB DISCIPLINES OF DENDRO

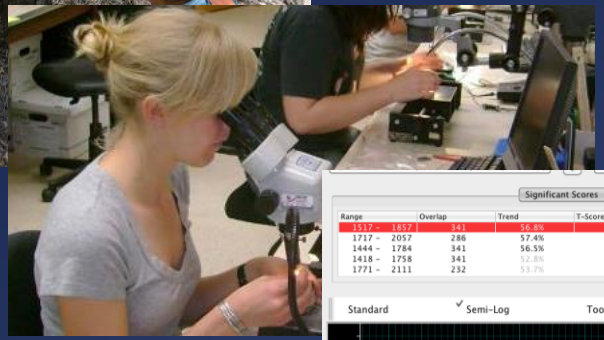
- Dendroarchaeology
- Dendroclimatology
- Dendrohydrology
- Dendropyrology
- Dendrogeomorphology
- Dendrochemistry

How is field information currently recorded?

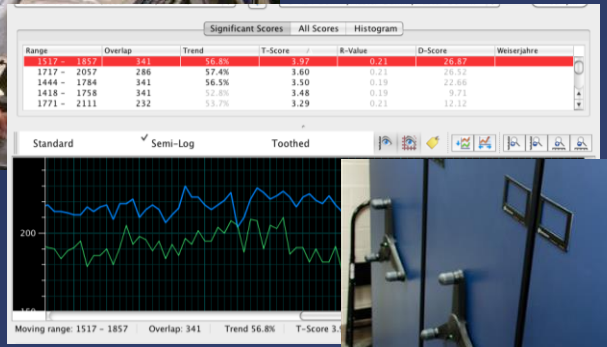
CURRENT FIELD COLLECTION

CURRENT FIELD COLLECTION

Sampling



Crossdating and measuring



Analysis

Archiving

DATA AND METADATA STANDARDIZATION

- Metadata - requirements vary depending on sub discipline
- Data - approximately 26 dendro data formats in use around the world with poor metadata support
- Replacing with Tree Ring Data Standard (TRiDaS)

What are our requirements for a field data collection system?

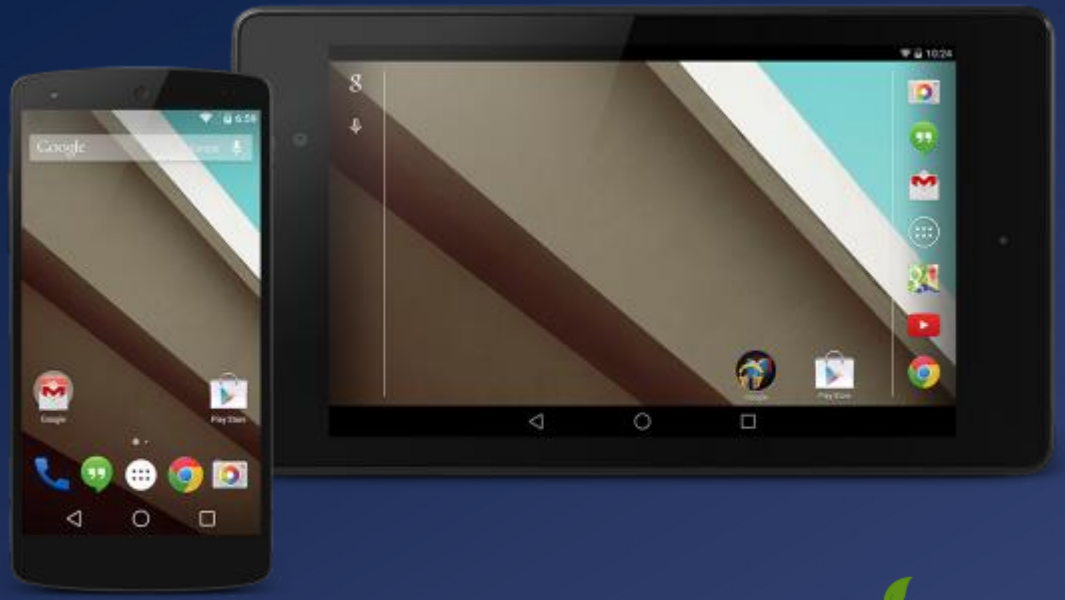
REQUIREMENTS

- Robust enough to cope with rough handling and weather conditions
- Cost effective
- As fast or preferably *FASTER* than traditional field notebooks
- Adapts easily to specific research questions
- Integrate directly into workflow back in the lab
- Standardized using TRiDaS

WHAT ARE PEOPLE IN INDUSTRY USING?

- Expensive
- Focused on location
- Data flow back and forth

What are we proposing?



OPEN DATA KIT

Tellervo

OPEN DATA KIT (ODK)

- Aimed at mobile data collection in developing nations particularly for healthcare
- Started as a Google Summer of Code project in 2008
- Open source project now run by University of Washington


SANTA FE INSTITUTE


openrosa


ODK
OPEN DATA KIT


SUSTAINABLE
ENGINEERING
LAB.
formerly Modi Research Group

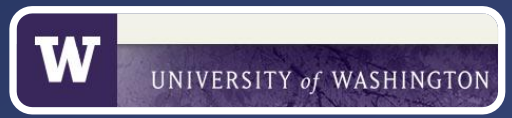

hrp
UNDP · UNFPA · UNICEF · WHO · World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction


ENKETO
SMART PAPER


KoBo Toolbox
KoBoForm
KoBoCollect
KoBoSync
KoBoMap


THE EARTH INSTITUTE
COLUMBIA UNIVERSITY

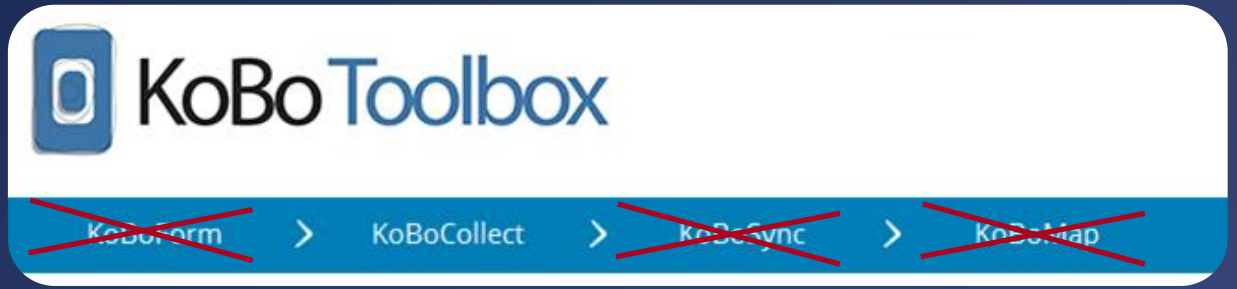

HARVARD
HUMANITARIAN
INITIATIVE


UNIVERSITY of WASHINGTON


Google

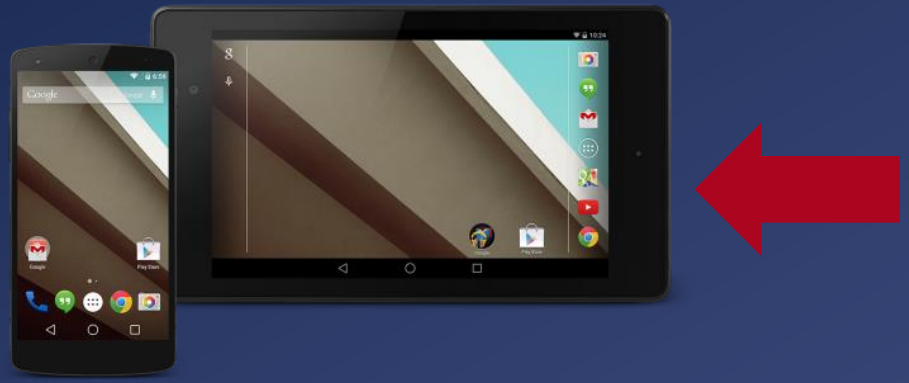

KoBo Toolbox
KoBoForm
KoBoCollect
KoBoSync
KoBoMap

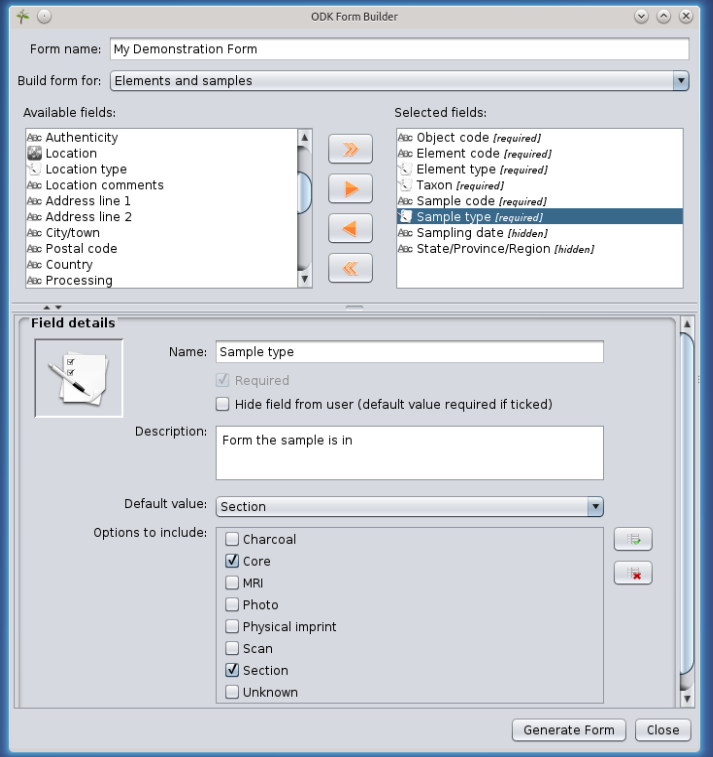
Tellervo

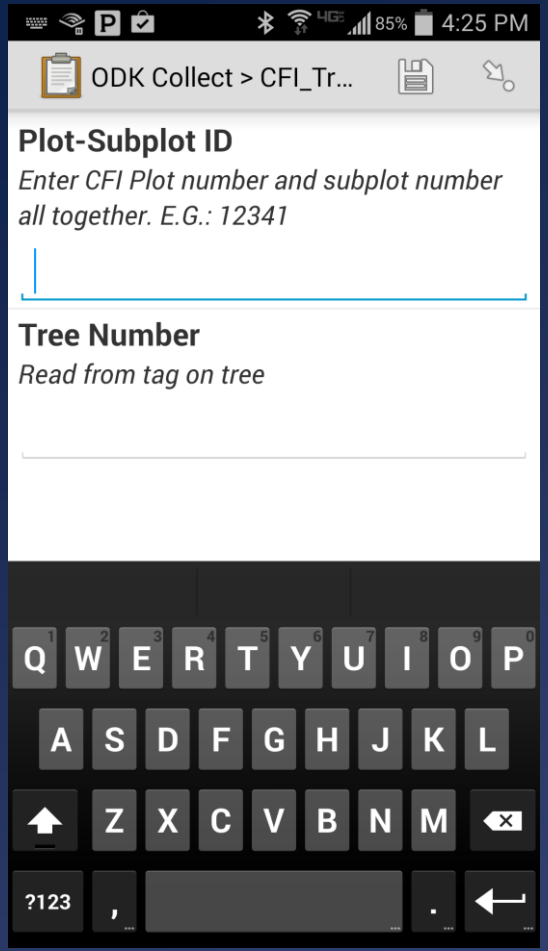


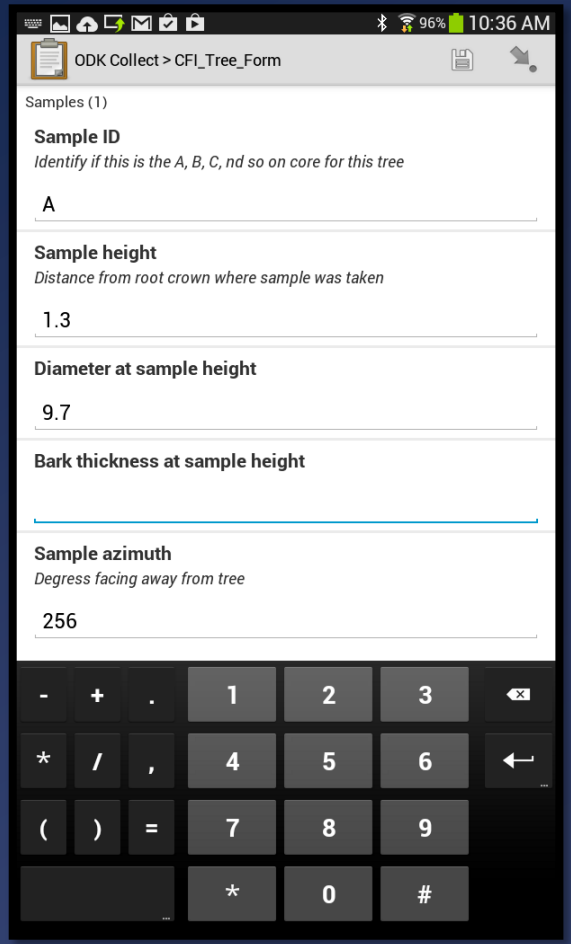
DESIGNING FORMS

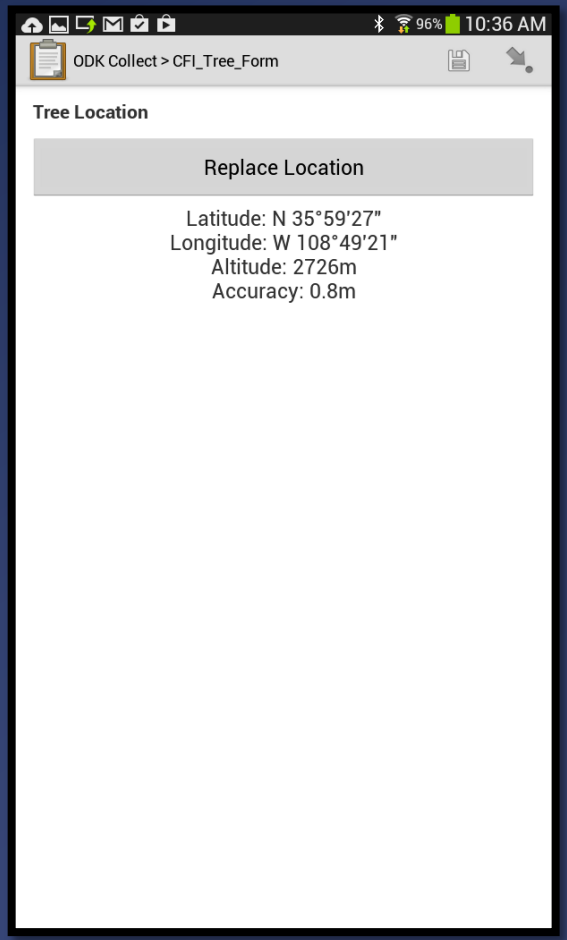
- Simple form builder within Tellervo
- All TRiDaS fields preconfigured – just pick the relevant ones
- Pick relevant dictionary terms






85% 4:25 PM
ODK Collect > CFI_Tr...
Plot-Subplot ID
Enter CFI Plot number and subplot number all together. E.G.: 12341
Tree Number
Read from tag on tree


96% 10:36 AM
ODK Collect > CFI_Tree_Form
Samples (1)
Sample ID
Identify if this is the A, B, C, nd so on core for this tree
A
Sample height
Distance from root crown where sample was taken
1.3
Diameter at sample height
9.7
Bark thickness at sample height
Sample azimuth
Degress facing away from tree
256

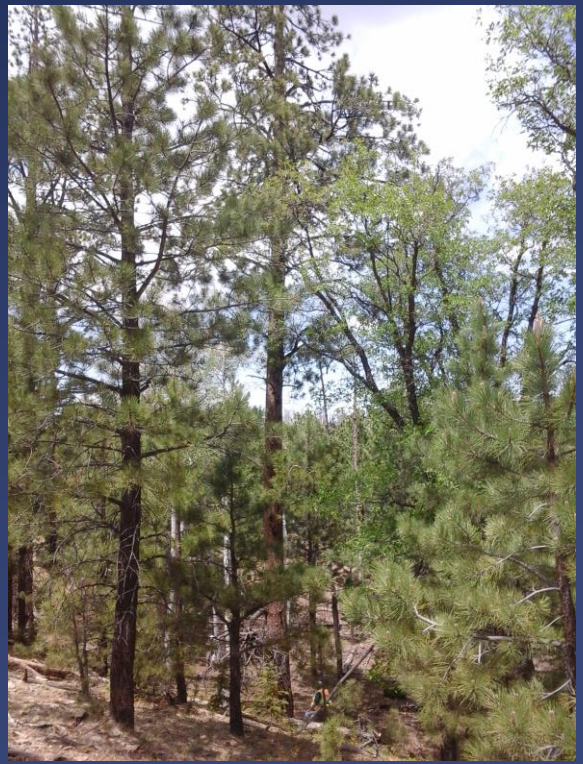

96% 10:36 AM
ODK Collect > CFI_Tree_Form
Tree Location
Replace Location
Latitude: N 35°59'27"
Longitude: W 108°49'21"
Altitude: 2726m
Accuracy: 0.8m

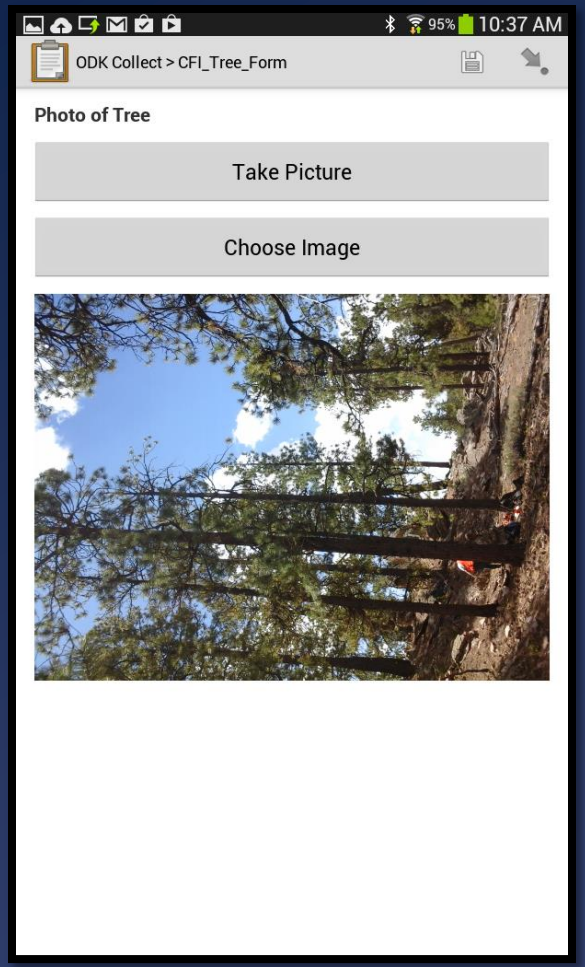
GPS COORDINATES

- Internal GPS chipset can be used with some success
- External GPS devices can be used for greater accuracy (inc. WAAS) and speed

MULTIMEDIA

- Good resolution photographs from tablet/phone hardware
- Capability to record sound and movies too
- Multimedia can be associated with a site, a specific tree or sample




95% 10:37 AM
ODK Collect > CFI_Tree_Form
Photo of Tree
Take Picture
Choose Image

```
<?xml version='1.0' ?>
<CFI_Tree_Form id="CFI_Tree_Form">
    <deviceid>C462EA37149F</deviceid>
    <start>2014-06-10T09:55:18.521-06</start>
    <end>2014-06-10T10:06:09.929-06</end>
    <meta>
        <instanceName>Tree: 29411-5011</instanceName>
    </meta>
    <PlotSubplotID>29411</PlotSubplotID>
    <TreeNO>5011</TreeNO>
    <Species>PIPO</Species>
    <CrownClass>Codc
    <TreeCondition>L
    <LCR>45</LCR>
    <Injuries>None</
    <TreePhoto>14024
    <TreeLocation>36
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    <NumberSamples>2
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        <SampleHT>1.
        <SampleDiam>
        <BarkThickne
        <SampleAzimu
        <SampleSide>
    </SamplesRepeat>
    <SamplesRepeat>
        <SampleID>B<
        <SampleHT>2.
        <SampleDiam>
        <BarkThickne
        <SampleAzimu
        <SampleSide>
    </SamplesRepeat>
    <Comments/>
</CFI_Tree_Form>
```

Bulk data entry...

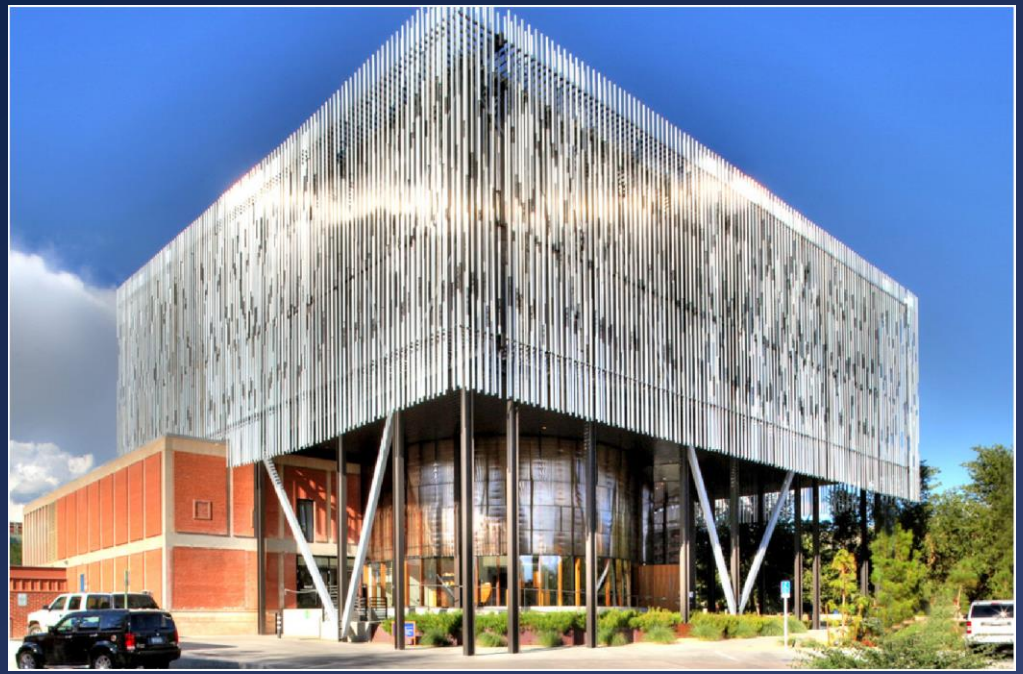
Object code	Element code	Type	Taxon	Comme...	Description	Latitude	Longtitu...	Slope A...	Slope Az...	Soil
29411	5001	Tree	Pseudotsuga menziesii (Mirb.) Franco		Injuries: Broken top. M...	-108.872	36.079	46	70	Thin
29411	5005	Tree	Pseudotsuga menziesii (Mirb.) Franco	Both hit ...	Injuries: Some brooming	-108.871	36.079	46	70	Thin
29411	5006	Tree	Pinus ponderosa Douglas ex C. Law...		Injuries: None	-108.871	36.079	46	70	Thin
29411	5007	Tree	Pinus ponderosa Douglas ex C. Law...	Stumpy ...	Injuries: Stumpy tree wi...	-108.871	36.079	46	70	Thin
29411	5008	Tree	Pseudotsuga menziesii (Mirb.) Franco		Injuries: None	-108.871	36.079	46	70	Thin
29411	5009	Tree	Pinus ponderosa Douglas ex C. Law...		Injuries: Crook at top.	-108.871	36.079	46	70	Thin
29411	5011	Tree	Pinus ponderosa Douglas ex C. Law...		Injuries: None	-108.871	36.079	46	70	Thin
29411	5014	Tree	Pinus ponderosa Douglas ex C. Law...		Injuries: Old dead top. ...	-108.871	36.079	46	70	Thin
29411	5018	Tree	Pinus ponderosa Douglas ex C. Law...	Tree ha...	Injuries: Crook at 4'. Ne...	-108.871	36.079	46	70	Thin
29411	5019	Tree	Pinus ponderosa Douglas ex C. Law...		Injuries: None. Some s...	-108.871	36.079	46	70	Thin
29411	5020	Tree	Pinus ponderosa Douglas ex C. Law...		Injuries: Old broken top...	-108.872	36.079	46	70	Thin
29411	5023	Tree	Pseudotsuga menziesii (Mirb.) Franco		Injuries: Sctrappy top.	-108.872	36.079	46	70	Thin
29411	5024	Tree	Pseudotsuga menziesii (Mirb.) Franco		Injuries: None	-108.872	36.079	46	70	Thin
29411	5026	Tree	Pseudotsuga menziesii (Mirb.) Franco	Dan's fir...	Injuries: Nine	-108.872	36.079	46	70	Thin
29411	5027	Tree	Pinus ponderosa Douglas ex C. Law...		Injuries: Old broken top	-108.872	36.079	46	70	Thin

Import selected

Objects | Elements | Samples

CONCLUSION

ODK / KoBoToolbox are very effective tools for collecting rich field metadata associated with point localities



Peter Brewer

Laboratory of Tree-Ring Research

pbrewer@email.arizona.edu

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